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H1Q QEC
U1S S1189 S2139

(56) Documents cited
IEE Proceedings, Part F, June 1982 Volume 129 No 3 pages 197-202 "Chaff" by Brian Butters
"Strategy of electromagnetic Conflict" Editor Lt-Col Fitts, Peninsula Publishing 1981 pages 98-100
"Applied ECM" by van Brunt, E.W, Engineering Inc 1978 Volume 1 pages 380-383

(58) Field of search
UK CL (Edition J) F3C CAJ, H1Q QEC QEX
INT CL[4] H01Q

(54) Broadsword anti-radar foil

(57) The limited advantage of chaff when the radar detection system to be confused has moving target indication (MTI) to screen out such 'slow moving' targets, is countered by the use of offset 45 degree angle fins at the base of the chaff foil pieces so as to present a doppler complication to the reflected radar wave. The rotational velocity of the foil could show up just as readily as a linear velocity of a target such as an aircraft. With many of this type of foil aloft, and each having somewhat different rotational velocities, the doppler system can conceivably be confused. At the same time, the rotation of these units help to increase the target area making a cluster of such units seem larger than actual in terms of the radar signature.

The design geometry of the blade coupled with the angular displacement of the fins, serve to govern the rotational velocity of the unit in flight, thus presenting each reflecting surface for a slightly longer exposure than if the blade were pointed and the edges streamlined. Prototypes have proved the aerodynamic stability of the units, and the added advantage of compacted stowage in a limited space is readily observed.

Figure I.

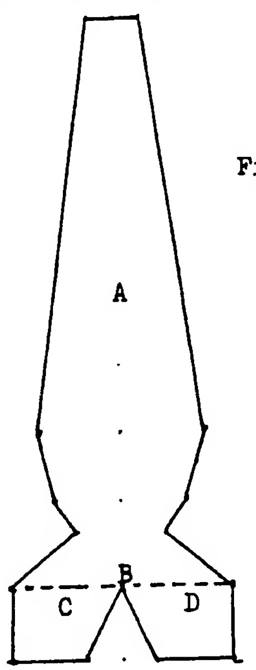
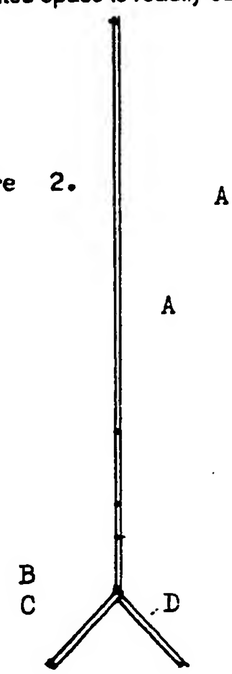


Figure 2.



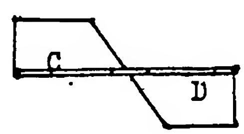


Figure 3.

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BROADSWORD RADAR COUNTERMEASURE FOIL.

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Figure I.

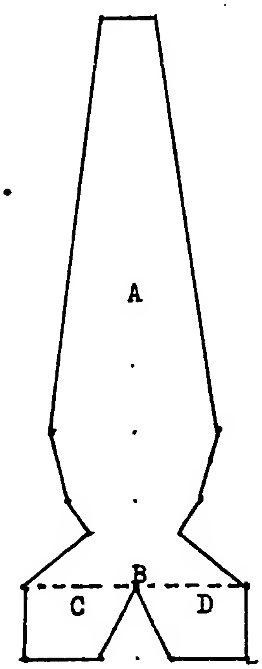
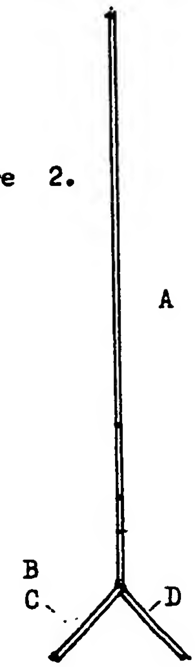


Figure 2.



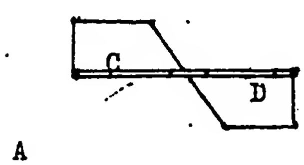


Figure 3.

BROADSWORD ANTI-RADAR FOIL.

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This invention relates to a new configuration in the field of passive Radar countermeasures. The title 'Broadsword' is in reference to its shape, and has no trade or personal connotations, serving only to differentiate it from other types of foil presently in use.

The use of aluminium foil to confuse ground to air Radar has been employed for a considerable number of years, with, in many cases, inadequate or uncertain results, and giving insufficient protection to the aircraft or target under fire. This is due mainly to its erratic movement in eddying air currents after release in the upper atmosphere which can leave large holes in the field of foils, through which the Radar beam can penetrate.

The essential technical features of this invention are as follows.-
The concept of the foil, as I will now describe, is a design of a military Radar countermeasure device, made from metalized mylar or aluminium foil having the approximate shape of a 'broadsword'- like projectile just under ten centimetres in length. Two fins located at the lower end of the foil are offset in relation to each other by an angle of 45 degrees. When dropped into the upper atmosphere by an aircraft, or the exploding nose- cone of a missile,in large quantities, each individual unit would disperse and begin rotating about its central axis. The light weight of individual units, combined with the rotating action, would allow the device to remain aloft for relatively long periods whilst exhibiting alternate reflecting surfaces to the transmitted Radar beam. Updrafts or thermal inversion conditions are also made use of by virtue of the cushion of air beneath the spinning fins. The foil maintains its vertical stance during the whole time it is in flight.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which :-

Figure I. Illustrates two dimensionally, the outline or shape of the foil.

Figure 2. The side view, showing the offset position of the fins.

Figure 3. View from above, showing the position of the 'blade' part of the foil in relation to the fins.

Referring to the drawing, it will be clearly observed that there is little or no complexity in its construction, the foil being fabricated from a single piece of very lightweight metalized mylar or aluminium sheet. There are no moving parts, with the possible exception of the fins which are preset at some stage during manufacture. There are only two functional parts to the finished unit. One being the 'blade', which is uppermost, and which supplies the alternate reflecting surfaces during rotation, and two being the fins causing the rotary motion imparted to the blade.
When the foil is released at a high altitude, it immediately takes on a vertical attitude due to its elongated shape, and begins its fall earthwards. The air passing between the two fins exerts an aerodynamic effect on the fin surfaces causing them to act like a propeller. Once rotation has been induced, the foil will maintain its vertical stance continuously due to the air pressure on both sides of the blade being equal at all times. It will then continue to rotate during its descent at the same r.p.m throughout.
For identification purposes, the blade which begins at the squared-off tip and terminates at the neck adjoining the shoulders and fin assembly, is nominated 'A'. The shoulders 'B', and the fins, 'C' and 'D' respectively.

CLAIMS

I. A passive military radar countermeasure foil, (hereinafter known as 'a shaped foil') which uses aerodynamic principles in its application.

2. A shaped foil which remains in a perpendicular attitude during its descent as claimed in claim I.

3. A shaped foil which continuously rotates during its descent, as claimed in claims I & 2.

4. A shaped foil which presents a continuous series of alternating surfaces to a radar transmission during its descent, as claimed in claim 3.

5. A shaped foil which has offset fins at the base to induce and maintain rotation during descent, as claimed in claims I & 3.

6. A shaped foil in which the use of the offset 45deg: fins present a varying doppler waveform to the resonant cavity of the missile receiver when many foils are in flight, as claimed in claims 3 & 4.

7. A shaped foil which causes a cluster of such foils to appear larger to the missile radar, due to the alternate surfaces presented to it, as claimed in claims 3-4-5 & 6.

8. A shaped foil which , when manufactured to certain dimensions, will resonate to frequencies relevant to missile radar transmissions, and , en-masse provide a conglomerate reflective field in addition to preceding claims.

9. A passive military radar countermeasure foil substantially as described herein with reference to I - 2 & 3 of the accompanying drawing.